CLAIMS:

1. A process for producing synthetic quartz glass, comprising the steps of:

feeding to a reaction zone a silica-forming raw material gas and a fluorine compound gas from a first nozzle at the center of a burner having a plurality of concentric nozzles, oxygen gas from a second nozzle disposed concentrically outside the center nozzle, and oxygen gas or hydrogen gas or both from a third nozzle disposed concentrically outside the second nozzle,

flame hydrolyzing the silica-forming raw material gas in the reaction zone to form fine particles of silica,

depositing the silica fine particles on a rotatable substrate in the reaction zone so as to create a porous silica matrix, and

fusing the silica matrix;

wherein the oxygen gas fed from the second nozzle is set at a flow rate with respect to the raw material gas flow rate which represents a 1.1- to 3.5-fold stoichiometric excess of oxygen.

2. A process for producing synthetic quartz glass, comprising the steps of:

feeding to a reaction zone a silica-forming raw material gas and a fluorine compound gas from a first nozzle at the center of a burner having a plurality of concentric nozzles, oxygen gas from a second nozzle disposed concentrically outside the center nozzle, and oxygen gas or hydrogen gas or both from a third nozzle disposed concentrically outside the second nozzle,

flame hydrolyzing the silica-forming raw material gas in the reaction zone to form fine particles of silica,

depositing the silica fine particles on a rotatable substrate in the reaction zone so as to create a porous silica matrix, and

fusing the silica matrix;

wherein the oxygen gas is fed from the burner at an overall flow rate with respect to the sum of the raw material gas flow rate and the overall hydrogen gas flow rate which represents a 1.1- to 3.5-fold stoichiometric excess of oxygen.

3. The synthetic quartz glass production process of claim 2, wherein the oxygen gas fed from the second nozzle is set at a flow rate with respect to the raw material gas flow rate which represents a 1.1- to 3.5-fold stoichiometric excess of oxygen.

4. The production process of ~~claim 1 or 2~~ CLAIM 1, wherein the porous silica matrix has a density of 0.1 to 1.0 g/cm^3.

5. A synthetic quartz glass produced by fusing and vitrifying the porous silica matrix according to the process of ~~claim 1 or 2~~ CLAIM 1, which synthetic quartz glass has a hydroxyl group concentration of at most 20 ppm and a fluorine atom concentration of at least 100 ppm.